

T/18P part III*

Bass Strait Oil & Gas N.L.
 17-23 Queensbridge Street,
 SOUTH MELBOURNE, Vic., 3205

REPORT 705/6

| | | | | |
|----------------------|------|------|------|-----------------------|
| D of M | A.O. | C.G. | E.O. | D.S.M.E. |
| | | | | REGISTER |
| Received Answered | | | | 30 MAR 1981 E & IL |
| DEPT. OF MINES | | | | |
| REF. No. | | | | |

QUARTERLY REPORT

ON

T.18P

BASS BASIN, TASMANIA

FOR

BASS STRAIT OIL & GAS N.L.

General Geological Services
 Work Order : 705

March, 1981

I N D E X

- 1.00 Introduction
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- BAS 705/4 Seismic Programme Map
- BAS 705/7 Cormorant Seismic Survey 1977
- BAS 705/8 Cormorant Prospect. Control for top of Eastern
 View - MISSING

1.00 INTRODUCTION

This report covers the work carried out for Bass Strait Oil & Gas N.L. with respect to T.18P for the period October 24, 1980 to January 23, 1981.

During the period, data collection again was prominent with the obtaining from B.H.P. (Hematite Petroleum Limited), the previous holders of the area, velocity survey data, detailed seismic lines for the HB77A, 75A and 73A surveys, plus earlier seismic sections. The Well survey was completed and formation tops evaluated from log sections.

Seismic re-interpretation is underway with emphasis on obtaining deep basin data and a re-evaluation of the Cormorant Project. Base map preparation continued so as to provide a suitable medium for re-contouring after seismic re-interpretation.

A marine seismic survey, BBS81 of 708 km has been planned and is due to commence on February 11, 1981.

Mr. Eric Denton has been appointed as Project Geophysicist for this area and joins the General Geological Consulting Staff. Details of Mr. Dentons experience and qualifications are as follows :

Eric Denton B.Sc. (Member of the Society of Exploration Geophysicists)
Petroleum Geophysicist

Mr. Denton graduated in 1948 from the University of Western Australia with a B.Sc. (Physics) Degree. Since that time he has worked continuously as a Geophysicist in both the Mining and Petroleum industries. For 11 years he worked for Seismograph Services Limited (U.K.) in the Middle East, Europe and Canada directing field parties and conducting velocity surveys. He returned to Australia in 1959 and for 9 years worked on both land and marine seismic surveys and interpretations for firstly, Geosurveys, Adelaide and then G.S.I. throughout Australia, New Zealand and New Guinea.

From 1964-1974 he was Chief Geophysicist for A.R.A.D. Pty. Ltd. which conducted the exploration effort of Timor Oil, International Oils Exploration, Amalgamated Petroleum and Minops Pty. Ltd.

From 1975-1978 Mr. Denton worked in Algeria for Resources Engineering and Management Inc. of Denver, Colorado conducting field seismic services and interpretation programmes. He has recently returned to Australia where he is presently engaged in consulting activities.

2.00 OPERATIONS PERFORMED

2.10 Data Collection

Some collection of geophysical seismic data still remains but the bulk of that work is over. The initial Well log evaluation to establish all formation tops in past Wells is completed and presented in Section 5.00. This work has been essential to establish velocity control for the re-interpretation of seismic and preparation of a synthetic seismogram programme.

Some seismic sections are still outstanding, but the bulk of the work is now satisfactorily completed.

2.20 Geological and Geophysical Evaluation Programme

Base maps have now been completed and evaluation of the total area has commenced; the position of the recently collected HB77A, 75A, 73A seismic lines to be used in re-evaluation have been plotted and preliminary contouring of selected seismic horizons has been commenced.

Along with the re-evaluation of the total permit area a re-interpretation of the Cormorant Prospect was carried out. This was done by collecting the HB77A lines previously shot in 1977 by Hematite Petroleum Ltd. and shown on accompanying plan BAS 705/7. A detailed report will be completed and submitted on this prospect during the next quarter. A preliminary map showing the control for the top of the Eastern View is enclosed in section 6.00 (BAS 705/8).

One untested prospect from the 1974 Flinders Survey, Kalperri will be further detailed by the BBS81 survey planned for early next quarter as will the pinchout plays along the western margin. An initial study commenced during the quarter on source rock evaluation and Burial and Thermal Geohistory analysis of the Basin. This was stimulated by the CSIRO-BMR Source Rock study, a synopsis of which was presented at the recent "PESA Symposium" on South Eastern Australia. This study will be similar to the one being carried out in the T.14P permit for Cue Minerals and should be completed by mid-year 1981. It is interesting to note the conclusions of the CSIRO-BMR study which fully back up Cue's decision to investigate the section deep in the Basin below the Eastern View Coal Measures.

"The study has confirmed the hydrocarbon source potential of the Eastern View Coal Measures, indicating a fair to good potential for the 'Upper' section, and a good to very good potential for the 'Lower'. The prevalence of vitrinitic kerogen is indicative of generally gas-prone source rocks, but the exinitic kerogen content in samples from some wells (e.g. Cormorant No.1; Pelican No.1) is sufficient to warrant an oil and gas-prone rating. The Otway Group is rated as a fair to good source for gas on the limited sampling.

Thermal maturation indicators show that at the deepest levels tested, notably in Cormorant No.1, source rocks in the Eastern View Coal Measures are within the mature zone for hydrocarbon generation, but that most wells were terminated in immature or transitionally mature source rock selections.

The Eastern View Coal Measures in the deeper parts of the Bass Basin would seem to meet all the pre-requisites for successful petroleum exploration, containing thick sequences of high quality mature source rocks, reservoir, and caprocks, and apparently suitable structures. Before the potential of the sequence can be further evaluated, high quality seismic data will be required to enable the structure at depth, and the facies distribution, to be better delineated."

Source : "Petroleum Potential of the Bass Basin" by E. Nicholas,
K.L. Lockwood, A.R. Martin, and K.S. Jackson. PESA Symposium,
November, 1980

3.00 OPERATIONS PLANNED3.10 Interpretation

Continued development of a synthetic seismogram programme will be continued and two-way time maps of interesting horizons on a 1:100,000 scale are planned. These will be prepared during the next quarter and hopefully integrated with the BBS81 shooting to provide a 4 km cover over the entire permit suitable for the delineation of initial prospects for drilling.

The Cormorant re-interpretation report will be concluded during the next period. Geological interpretation will continued on formation picking and development of a depositional model. This will be aided by the planned :

Burial and Thermal Geohistory Analysis of the Bass Basin

It is proposed that the Burial and Thermal Geohistory Analysis of the Bass Basin be conducted in two stages which are briefly as follows :

| <u>STAGE</u> | <u>DESCRIPTION</u> | <u>APPROX COMPLETION TIME</u> |
|--------------|---|-----------------------------------|
| I | Preparation of Geohistory diagrams (with reports) for each well included in study. | 6 - 8 weeks |
| II | Basin-wide time series analysis of thermal values, paleostructure and basement subsidence rates for the Bass Basin. Assessment of favourable areas for hydrocarbon generation and entrapment. | One month after Stage 1 complete |

This analysis will provide quantitative data which would :

- identify areas of maximum paleo-heat-flow in the basin and hence maximum potential oil generation during basin development.

- relate the timing of such theoretical oil generation to the time of formation of drilled structures.
- aid the prediction of timing of formation of undrilled target structures and hence the likelihood of such structures containing hydrocarbons.

The following wells will be considered initially for this permit:

| | |
|--------------|---------------|
| TOOLKA # 1 | CORMORANT # 1 |
| AROO # 1 | BASS # 1 |
| BASS # 3 | TAROOK # 1 |
| NANGKERO # 1 | POONBOON # 1 |
| NARIMBA # 1 | PELICAN # 1 |
| KON KON # 1 | |

STAGE I

Stage I basically involves the production of a Burial and Thermal Geohistory Diagram for each well and a report accompanying each Diagram.

Production of the Diagram Requires:

- Collation of data.
- Corroboration of data and rejection of suspect data.
- Computer analysis and production of the Geohistory Diagram.

Report

The Stage I report will include, for each well:

- a listing of input data used for each diagram.
- a copy of the Geohistory Diagram at 1:10,000 scale.
- a ready-reference (A-4 sized) Geohistory Diagram.
- a description of the salient features of the diagram concentrating on the geotectonic aspects and their significance in the light of current theories on the formation of the Bass Basin and other Southern Margin Basins.

STAGE II

Stage II involves the basin-wide analysis of factors such as heat-flow and subsidence rates, for specific time intervals, as measured from the Geohistory Diagrams produced in Stage I.

A time series of maps of the Bass Basin will be produced showing:

- Thermal indicator (e.g. Vitrinite reflectance= R_o) values for particular geologic horizons (e.g. base Eastern View Coal Measures) at selected time instants, which will indicate areas of maximum heat flow and potential hydrocarbon generation.
- Broad-scale paleostructure for selected geologic horizons through time.
- Basement subsidence rates through time.

Report

The report for Stage II will include the abovementioned Maps and an assessment of favourable areas for hydrocarbon generation and entrapment.

ESTIMATED COMPLETION DATES

Stage I

The Stage I report including Geohistory Diagrams is anticipated six to eight weeks from commencement of the project. The computer programmes should be ready to run in late March.

Stage II

The Stage II report should be available one month after completion of Stage I. It is anticipated that this report will be ready by early July.

3.20

BBS.81 SEISMIC PROGRAMME

167012

Bass Strait Oil & Gas N.L.
153 Dorcas Street,
South Melbourne, 3205

Report 705/5

BBS.81 SEISMIC PROGRAMME
FOR
PETROLEUM EXPLORATION PERMIT
T.18P

Work Order 705

October 1980

I N D E X

1.00 INTRODUCTION

2.00 CURRENT INTERPRETATION

3.00 SPECIFICATION FOR SEISMIC REFLECTION SURVEY

3.10 General

3.20 Parameters of Survey and Contractors tender

4.00 ILLUSTRATIONS ACCOMPANYING REPORT

BAS 705/4 Location Plan BBS.81 Survey

MISSING

{ BAS 705/5A Seismic Programme Line Map BBS.81 Survey
5B

1.00

INTRODUCTION

As mentioned in the Quarterly Report for the period ending September, 30th 1980, (Report 705/4), a preliminary seismic programme has been formulated for Permit TAS. T.18P. This is to take the form of a marine seismic survey of 708.5km. The reasons for and the details of this programme are the basis of this report.

This report is also to inform Geophysical Services Inc., who will be conducting the survey of the details and parameters which have formed the basis of their successful tender for the work.

CURRENT INTERPRETATION

2.00

Petroleum Exploration Permit T 18P is in the Bass Basin on the continental shelf of southeastern Australia. The basin trends northwest to south east and the southwestern boundary of the permit area co-incides approximately with the southwestern margin of the basin.

Previous geophysical work includes preliminary aeromagnetic surveys between 1962 and 1975. Early surveys used a dynamite source for single fold coverage with an analog recording system. Dynamite continued to be used as a source after 1967 and the latest seismic survey available to Bass Strait Oil and Gas N.L. was shot by Hematite Petroleum Pty. Ltd. during January, 1975.

General specifications were:-

Data Acquisition

| | |
|-----------|----------------------------|
| Source | 1,200 cu. in. airgun array |
| Cable | 3,200 m. 48 groups |
| Recording | DFS 111, binary gain |

Digital Processing

3:1 Vertical Stack
24 fold CDP Stack
Deconvolution before and after stack.

The interpretation report:- "Flinders Seismic Survey", by J.I. Denham, M. McNicol and E. Urschel of Hematite Petroleum Pty. Ltd. - includes maps of three horizons:-

- 1) Yellow Horizon
Correlated to the top of the Eastern View Coal Measures.
- 2) Red Horizon
Marker within the coal section of the Eastern View Group.
- 3) Blue Horizon
Deepest event mapped but limited to the Aroo area. Its position in the stratigraphic column was not determined. Its depth near the Aroo No. 1 location was estimated as 3430 metres. The deepest depth contour mapped was 3960 metres.

Limited success was therefore achieved in mapping the section below the Eastern View Group where a prospective 3,000 metres of Early Cretaceous sediments is believed to exist in some of the troughs near the centre of the basin. In the conclusions to their report the authors believe that improved field methods and equipment will be necessary to yield adequate reflection data from below the Eastern View Coal Measures.

The current survey, planned by Bass Strait Oil and Gas N.L., will use more sophisticated equipment in the field:-

| | |
|-----------|----------------------------|
| Source | 2,000 cu. in. airgun array |
| Cable | 2,400 metre, 96 groups |
| Recording | DFS V floating point gain |

Improved data should result. The network of lines planned ties all wells in the permit area and most of the more recent seismic traverses. The new assignment should allow a better evaluation of prospects in the Eastern View Group as well as as appraisal of the deeper Early Cretaceous section.

3.00

SPECIFICATION FOR MARINE SEISMIC SURVEY

3.10 General

A total of 708.5 km. are required to be shot. This survey is to be known as B.B.S. 81 and the lines are shown on the accompanying plan BAS 705/5 (Scale 1:100,000).

Details of the lines are as follows:-

Line numbering convention

ODD SW - NE

EVEN NW - SE

| <u>LINE</u> | <u>LENGTH(KM)</u> | <u>REMARKS</u> |
|-------------|-------------------|---|
| BBS 81-1 | 62.8 | Tie Toolka No. 1 well |
| BBS 81-3 | 63.6 | |
| BBS 81-5 | 85.8 | Tie Cormorant No. 1 well |
| BBS 81-7 | 23.2 | Tie Aroo No. 1 well |
| BBS 81-9 | 40.0 | Tie Bass No. 1 well |
| BBS 81-11 | 13.0 | |
| BBS 81-13 | 22.8 | |
| BBS 81-15 | 24.2 | |
| BBS 81-15A | 11.0 | |
| BBS 81-17 | 17.0 | |
| BBS 81-2 | 51.0 | |
| BBS 81-4 | 19.0 | Tie Cormorant No. 1 well |
| BBS 81-6 | 92.5 | Tie Aroo No. 1, Tarook No. 1 wells and extend south to Pelican field via BCS 81 traverses |
| BBS 81-8 | 11.6 | |
| BBS 81-10 | 15.0 | |
| BBS 81-12 | 45.0 | |
| BBS 81-14 | 111.0 | |
| 17 lines | 708.5 km | |

Tas T.18P

BBS.81 Survey

| | |
|--|---|
| Cable | : 2400 metres, 96 trace, 48 fold 12 metre (40ft + 5ft) depth |
| Shot | : 1 pop per shotpoint, every 25 metres |
| Sample Rate | : 2 milliseconds all lines |
| Record Length | : 5 seconds |
| Filters | : 2 millisecond sample rate |
| High Cut | : (8 Hertz/18dB octave.. |
| Low Cut | |
| High Cut | : 128 Hertz/72dB per octave |
| Cable Noise | : 3 microbars (to be monitored at board (riders discretion but (on no account is (maximum |
| Swell Noise | : 4 microbars (allowable to apply to (more than 30% of any (line. |
| Monitor Records Displayed | : Every 50 shotpoints Defloat monitors on request |
| EPC Shipboard Section | : Trace 92 |
| Runout at End of Lines | : Has been allowed for on survey plan map |
| Navigation Specifications | : Masivan Shore Stations as per Contractors' specifications |
| Feathering Angle to be listed | : Every 100 shotpoints when less than 6° Every 50 shotpoints when 6° to 10° not to exceed 10° |
| Shotpoint Location to be Annotated by Navigation System | : Every 10 shotpoints |
| Cable Offset | : Measured every start of line, and every 40 shotpoints |
| Magnetics and Gravity | : Not required |

B. Data Processing

By discussion following acquisition.

For your survey we shall provide the following:

1. Vessel (Appendix A)

We will make available our vessel the "Eugene McDermott 11". Subject to prior commitments and also to delays outside GSI's control in the vessel's current program schedule, we anticipate that the vessel should be able to commence your survey in December 1980.

2. Energy Source (Appendix B)

GSI's 2000 cubic inch tuned airgun array will be provided as the seismic energy source.

3. Recording Cables (Appendix C)

GSI's Acceleration Cancelling Hydrophone Marine Streamer cable which can be made up of 96 twenty-five metre or thirty three metre groups or 48 fifty metre groups would be used.

4. Seismic Data Recording Instrument System

For the recording of the seismic data, DFS V instruments. Recording would be on 1/2 inch magnetic tape, packing density 1600 BPI, in SEG-B format.

5. Shooting Geometry

Data would be recorded at a 25 metre pop interval, hence, with 96 groups (2400m cable), a 48 fold, 96 group recording would result.

6. Monitors

EPC 4600 Graphic Recorder for onboard single coverage sections.
A 63 trace oscillograph camera display for onboard monitoring and

playback quality control.

The vessel will be equipped with radar, a continuous recording fathometer capable of recording depths of up to 1,000 fathoms and radio communications equipment for regular liaison with shore based personnel.

7. Personnel

A crew complement of seismic vessel operating personnel experienced in marine seismic operations.

8. Supplies

All operating supplies necessary to operate and maintain the field unit including fuels, lubricants, food and provisions, magnetic tapes and ancillary recording supplies.

9. Quality Control

We will furnish a shipboard Vessel Controller whose responsibility is to ensure that Quality Control standards are within specifications.

10. Water Depths

Water depths to be not less than 12 metres at the vessel and at all points along the cable.

11. Horizontal Survey Positioning System

GSI will provide a Maxiran shore based positioning system for primary horizontal survey control. The system will be comprised of one shipboard mobile unit and a minimum of 3 base stations and sufficient personnel to operate all stations on a 24 hour

basis. Not included in prices quoted are costs for any extraordinary survey logistics such as helicopters, boats, etc.

12. Compensation for Data Acquisition

Basic System

- 2000 cubic inch tuned airgun array
- All necessary personnel and supplies, including field tapes
- Texas Instruments DFS V Recording Systems. Recordings to be made on ½ inch magnetic tape in SEG-B format
- 96 trace recording
- 5 second record length
- Maxiran shore based positioning system

13. a. Mobilisation

Australian Dollars 30,000.00

b. Turnkey Rate (assumes 400 kms, average line 50 kms)

| <u>Cable Length</u> | <u>No. of Traces</u> | <u>Shot Interval</u> | <u>Fold Coverage</u> | <u>Sample Rate</u> | <u>A\$/km</u> |
|---------------------|----------------------|----------------------|----------------------|--------------------|---------------|
| 2400 | 96 | 25m | 48 | 2 | 466.00 |

Kilometres of coverage will be computed based on the number of "pops" or shots per line multiplied by the "pop" or shot interval.

c. Daily Rate

A daily rate or standby charge of A\$19,680.00 per day or prorated on a twenty-four hour basis for lesser periods.

Daily rate shall be payable for: time during which the survey vessel is unable to conduct operations due to any cause beyond GSI's reasonable control (except damage to the vessel), including but not limited to, time spent waiting on instructions or services to be provided by Bass Strait and standby due to weather and feathering.

14. Items to be Furnished by Cue Minerals

Bass Strait shall furnish all other personnel, equipment, supplies and services required for the performance of this survey over and above those furnished in connection with the field unit as described above, such as but not limited to the following:

- a. All permits necessary to conduct the operations including those required for: entry into the operations area, entry of the personnel and material of the field unit and supply operations.
- b. Import duties (or taxes in lieu thereof) and agents' fees that may be levied on or incurred by the field unit or survey control stations, or their supplies and provisions.
- c. Program charts, base maps and preplots which will be delivered to GSI at least ten days prior to anticipated commencement of operations. The program charts shall give the end points on each line segment in co-ordinates in the same co-ordinate system as that used for control stations.
- d. All extra personnel required by local laws and regulations, such as, but not limited to services of local marine pilots, standby vessel crews, and the like.

- e. Fisheries Inspector or other Governmental agents, if required as condition of permits, including vessel and other expenses for them.
- f. A support vessel for such uses as logistical support and relocation of Maxiran base stations, at-sea data drops and other operational requirements if necessary.

For those above items furnished by GSI upon Bass Strait's request, GSI is to be reimbursed at cost plus a 12 percent handling fee.

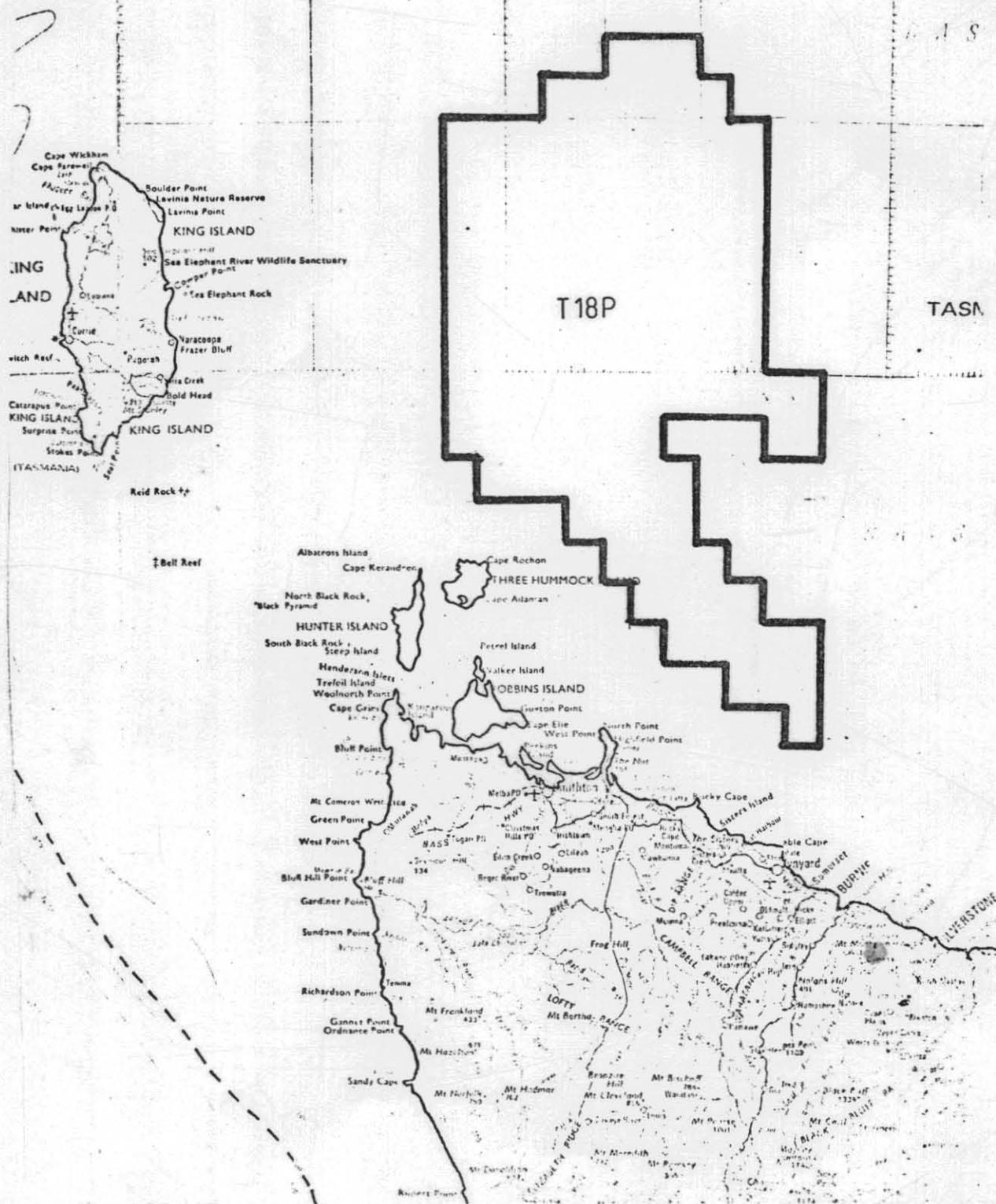
- 15. This proposal assumes that Bass Strait will make available sufficient light diesel to GSI for the performance of this survey. Our prices are based on the current price of A\$00.26/litre. If the actual price during the survey exceeds this price, then Bass Strait is to reimburse GSI for the actual price in excess of A\$00.26/litre.

4.00

ILLUSTRATIONS ACCOMPANYING REPORT

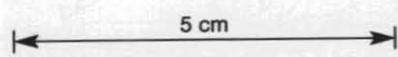
167025

- Warrill
- Bell Point
- Cape Liptrap
- Shellback I
- Tongue I
- Norman I
- Tidal
- Great Glennie I
- GLENNIE GROUP
- Cicadel I
- CI
- ANSER
- FO
- Rod



LOCATION OF SEISMIC SURVEY B.B.S.81

BASS STRAIT OIL AND GAS N.L. CORMORANT PROSPECT



BSO.705/4
SCALE 1:1,000,000

PART OF MELBOURNE SJ.55
& TASMANIA SK.55

4.00

EXPENDITURE

BASS STRAIT OIL & GAS N.L.PERMIT TAS T.18PQUARTERLY REPORT - EXPENDITUREQUARTER ENDING : January 23, 1981

| LEASE FEES (RENTALS) | OFFICE OVERHEAD | OFFICE STUDIES | FIELD | | |
|-------------------------|--------------------|---|------------|-------------|----------|
| | | | GEOLOGICAL | GEOPHYSICAL | DRILLING |
| | \$3,750 | Geological & Geophysical Evaluation \$12,000 | \$3,000 | \$2,000 | |

SIGNED : _____

5.00

APPENDIX

WELL DATA

SEISMIC MARKERS - AROO NO. 1

HB 73A-143

B71A44

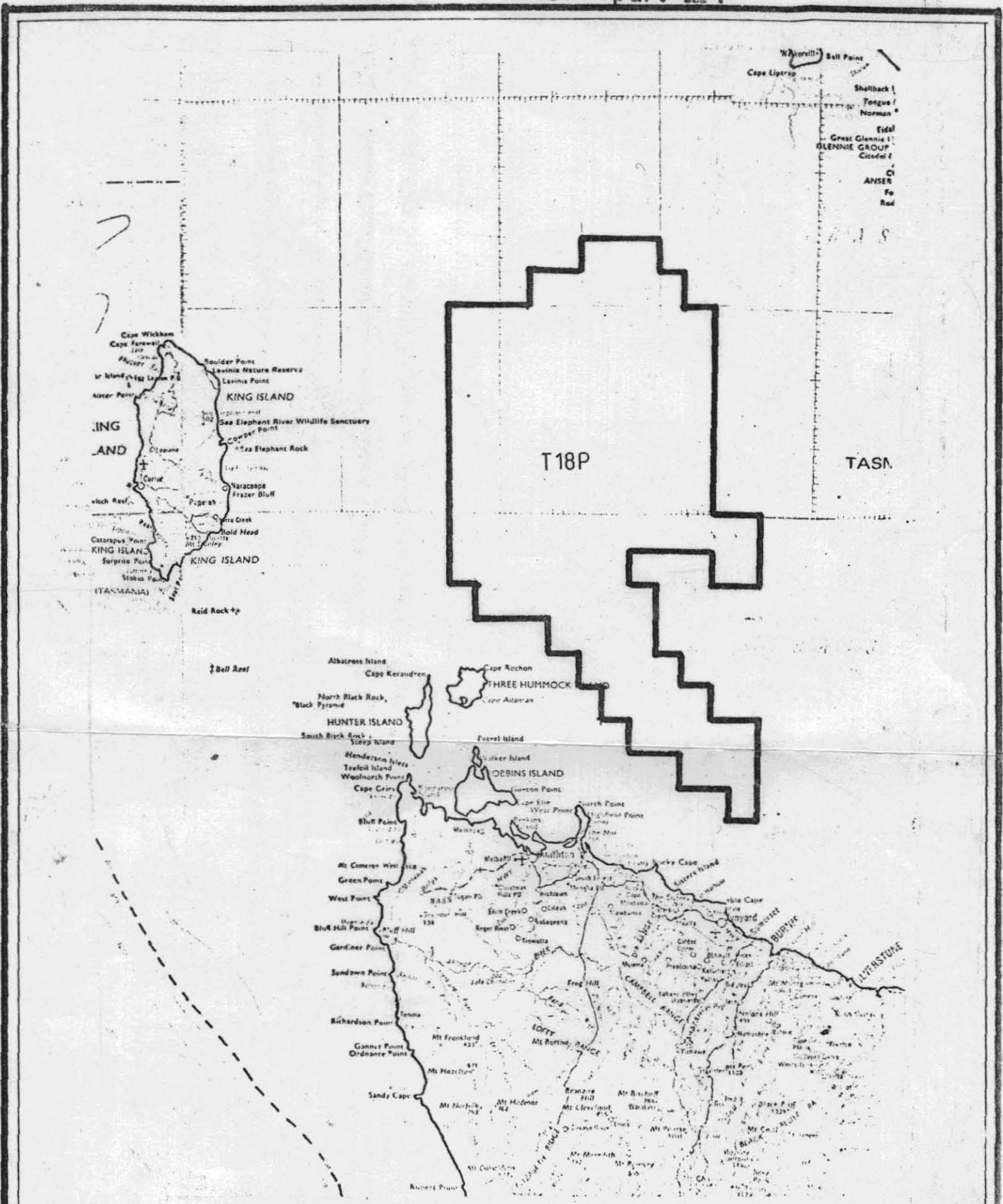
| | | <u>AROO</u> (SP.1417) (Sec.) | <u>LINE END</u> (Sec.) |
|------------------|--------|------------------------------------|---------------------------|
| Top Eastern View | | | |
| Yellow Horizon | 6,500' | 1.7 | 1.6 |
| Red | 8,000 | 1.92 | 1.92 |
| Brown | 10,000 | 2.2 | 2.2 |
| Blue | 11,500 | 2.44 | 2.5 |
| Green (Basement) | 17,000 | 2.68 | 2.68 |

CROSS SECTION
(SEISMIC SECTIONS)

| | TOOLKA | CORMORANT | | BASS 1 | |
|---------------|--------|-----------|-------|----------|----|
| | | FT. | M. | FT. | M. |
| Mid. Miocene | 1,200 | 365.76 | 2,500 | 762.00 | |
| Oligocene | 2,700 | 822.96 | 4,050 | 1,234.44 | |
| Eocene Shale | 3,600 | 1,097.28 | 5,400 | 1,645.92 | |
| Eastern View | 4,300 | 1,310.64 | 5,900 | 1,798.32 | |
| P. Asp | 5,200 | 1,584.96 | 6,800 | 2,072.64 | |
| U.M. Diversus | 6,200 | 1,889.76 | 7,700 | 2,346.96 | |
| L.M. Diversus | 7,700 | 2,346.96 | | | |
| L. Balmei | 10,600 | 3,230.88 | | | |

167038

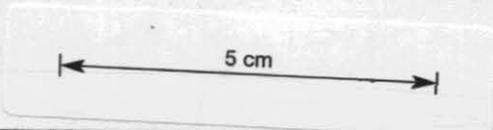
6.00 ILLUSTRATIONS ACCOMPANYING REPORT



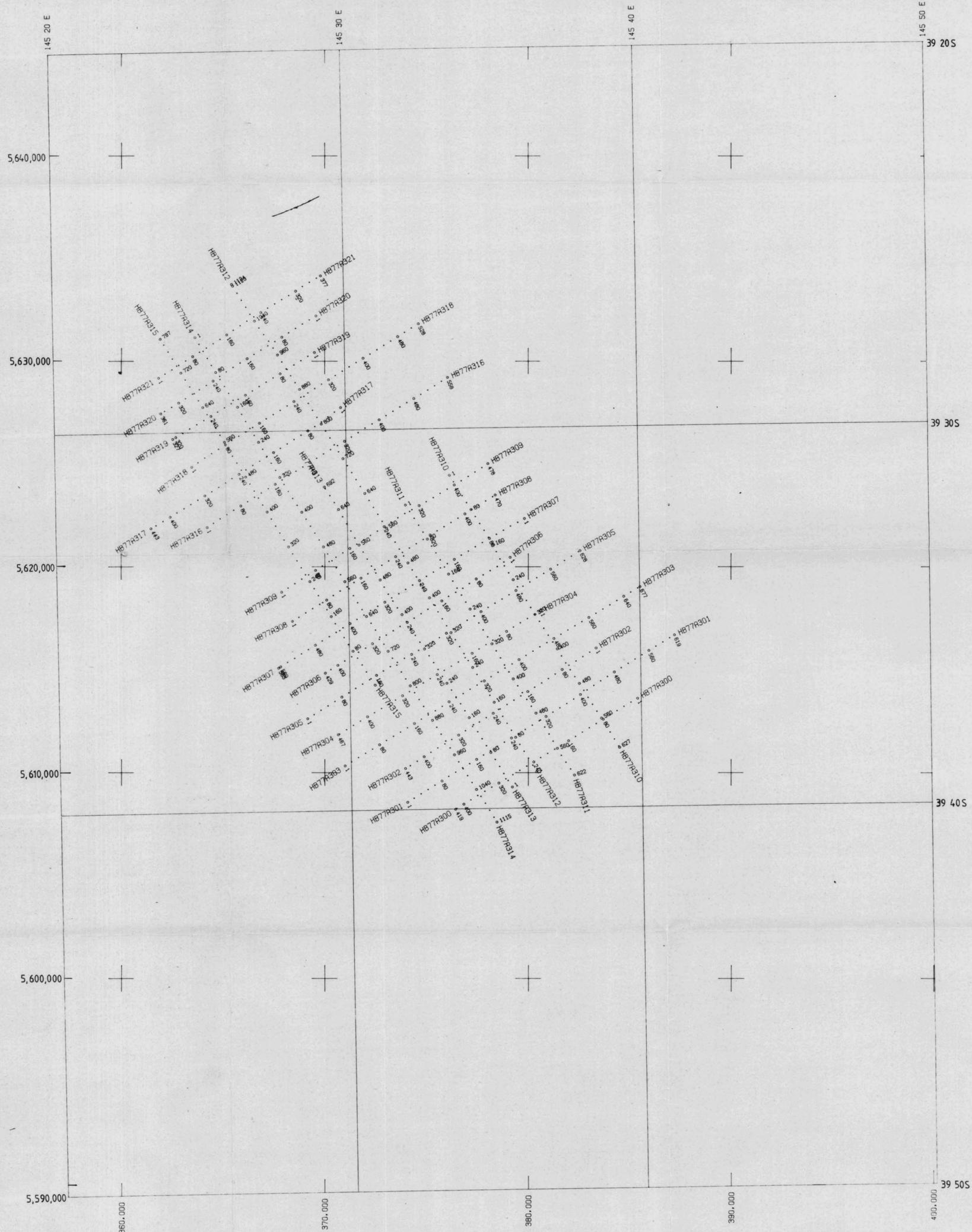
LOCATION OF SEISMIC SURVEY B.B.S. 81

BASS STRAIT OIL AND GAS N.L. CORMORANT PROSPECT

BSO. 705/4
SCALE 1:1,000,000



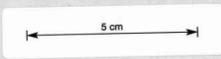
PART OF MELBOURNE SJ.55
& TASMANIA SK.55



Scale 1:100,000



Projection UTM Zone 55 CM 147°E
Compiled by Bass Strait Oil & Gas N.L.



BASS BASIN, T18P
CORMORANT SEISMIC SURVEY 1977

MAPPING INFORMATION: GENERAL

- Oil Well
- ⊙ Gas Well
- ★ Oil & Gas Well
- Analog Seismic Shot Point
- ⊙ Digital Seismic Shot Point
- Block No.
- Oil Show
- ⊙ Gas Show
- ★ Oil & Gas Show
- Drilling
- ⊙ Dry Hole (abandoned)
- Petroleum Tenement Boundary

MAPPING INFORMATION: DEPTH

- Contour in metres
- Isopach contour in metres
- Fault, "D" downthrow side

MAPPING INFORMATION: TIME

- Times in msec below sea level
- Contour interval 50 msec
- Contour based on fair seismic data
- Contour based on conjecture

Datum: SEA LEVEL
Contour interval:
Author:
Date:
Drawn by: J. POPPENBECK
Checked by:
Revised:

OR-0164